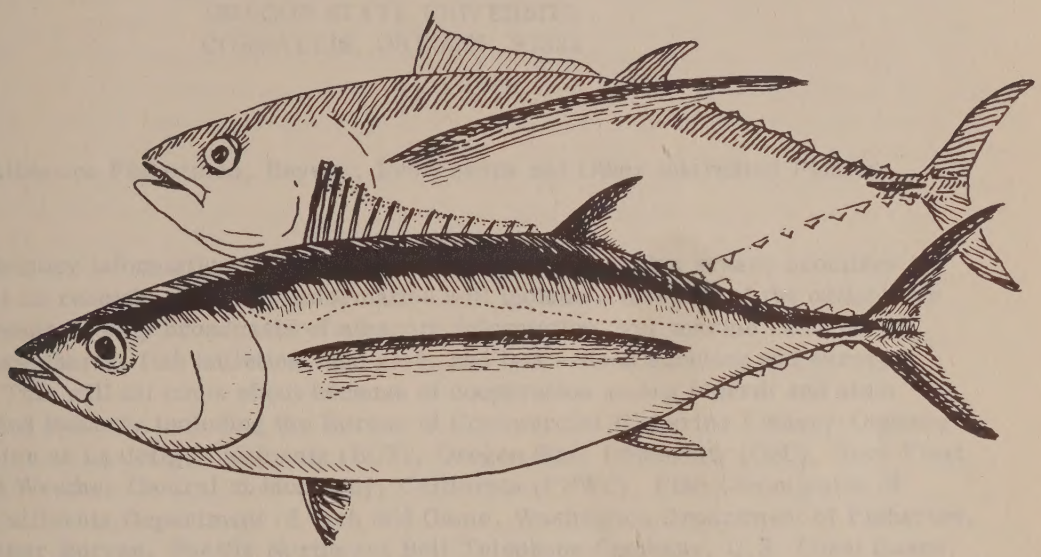
FISHING INFORMATION

APRIL 1970



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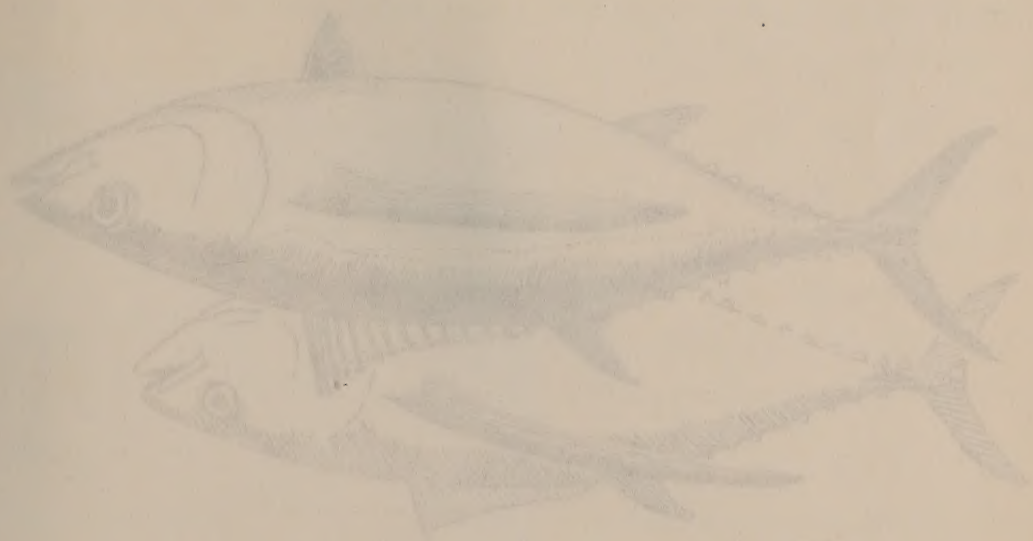
UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
BUREAU OF COMMERCIAL FISHERIES
FISHERY-OCEANOGRAPHY CENTER
LA JOLLA, CALIFORNIA



FISHING INFORMATION

UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
BUREAU OF COMMERCIAL FISHERIES
Fishery-Oceanography Center
La Jolla, California 92037

and

DEPARTMENT OF OCEANOGRAPHY
OREGON STATE UNIVERSITY
CORVALLIS, OREGON 97331

TO: All Albacore Fishermen, Buyers, Processors and Other Interested Parties

Advisory information to the albacore fishing industry this season promises to be the best on record. Advisory information will include a forecast of the outlook for the 1970 season, daily broadcasts of albacore information over marine radio bands, temperature charts, fish bulletins, and early and late season scouting and survey cruises. This will all come about because of cooperation among federal and state agencies and industry including the Bureau of Commercial Fisheries Fishery-Oceanography Center at La Jolla, California (BCF), Oregon State University (OSU), Navy Fleet Numerical Weather Central at Monterey, California (FNWC), Fish Commission of Oregon, California Department of Fish and Game, Washington Department of Fisheries, U.S. Weather Bureau, Pacific Northwest Bell Telephone Company, U.S. Coast Guard, U.S. Air Force, National Aeronautics and Space Administration, and cooperating albacore fishermen, buyers, and processors.

A forecast of the outlook for the 1970 albacore season will be issued by BCF in early June. The forecast will include short-term projections of albacore distribution, oceanographic and atmospheric trends, and landings. Much of the environmental information used by BCF in albacore forecasting operations is made available through a cooperative arrangement with the Navy FNWC at Monterey, California.

BCF and OSU Albacore Central will cooperate closely on issuance of a daily broadcast over radio station WWD, which is licensed to BCF and located on the campus of Scripps Institution of Oceanography at La Jolla, California, and the Astoria Marine Operator (KFX, 2598 kHz). Broadcasts will include latest albacore information obtained from research vessels, cooperating fishing vessels, unloading station operators, and will contain sea surface temperatures and other pertinent oceanographic information and weather information which may be useful to albacore fishermen. Double sideband voice broadcasts will be broadcast by WWD twice daily during weekdays only from June 22-October 31, or until the season ends, on frequency 4415.8 kHz and 8805.6 kHz at 0600 PDT and 1945 PDT. Single sideband transmissions will be broadcast by WWD on 8805.6, and 12403.5 kHz. The same broadcast, with marine weather information for California deleted and tailored for the Pacific Northwest, will be broadcast by the Astoria Marine Operator KFX at 1015 PDT and 2215 PDT on 2598 kHz. The Astoria Marine Operator will also broadcast an albacore advisory message on weekends at the same hours. The heading for the WWD broadcast will be "Daily Albacore Fishery Information (date)" and for the Astoria Marine Operator, will be "Daily Albacore Fishery Information compiled by Bureau of Commercial Fisheries and Oregon State University."

As has been done for the past 10 years, BCF will issue 15-day sea surface temperature charts from April 15 to October 31 or until the season ends, for the area roughly between central Baja California and Vancouver Island out to 135° W. A fish bulletin will also be issued with each temperature chart beginning about June 15 to the end of the season. These bulletins will include: information on oceanographic and atmospheric trends, locations of productive fishing areas, changes in market and unloading conditions which may affect effort, and other data as are appropriate. In addition BCF will publish a 30-day chart showing barometric pressure and wind direction and speed for the previous 30-days and a chart showing the 10-year average barometric pressure and winds for that month. In addition, OSU Albacore Central will again issue fish bulletins and sea surface temperature charts this year. These charts will concentrate on small-scale features along the Oregon coast out to 200 nautical miles as information becomes available, but will probably not be issued so frequently as last summer's once per week. The BCF and OSU temperature charts and fish bulletins will be bulk-mailed to fish buying stations and others for further hand-distribution to fishermen. BCF and OSU Albacore Central have exchanged bulk-mailing lists in an effort to extend advisory information to more fishermen.

This season California and Oregon waters will be the best-scouted for albacore in recent years. BCF's research vessel DAVID STARR JORDAN will sail on June 22 from San Diego southwesterly to about 150 miles offshore, then northwesterly to the vicinity of San Juan Seamount and then proceed north up the coasts of California and Oregon in waters of favorable temperature, probably about 150 miles offshore. This track is flexible and will be altered if deemed necessary in light of conditions found to be prevailing in early June. The cruise will end on July 3 in Newport, Oregon, from where JORDAN will sail for other studies. Trolling for albacore during daylight hours will be carried out along the entire track of the scouting cruise, with each day's fishing beginning where it was stopped the prior day. The thermo-salinograph will be operated continuously and information on mixed layer depth will be obtained from XBT drops. Other oceanographic observations will be made at night including midwater trawl and zooplankton hauls which will be used to obtain estimates of potential albacore forage; subsurface salinity and temperature observations will also be made. JORDAN will also make a cruise in October to study where the albacore exit the Pacific coast fishery and what environmental conditions accompany the decay of the albacore season. The Fish Commission of Oregon plans a 10-day charter cruise to scout for albacore in waters of favorable temperature off the coast of Oregon commencing about July 1 aboard F/V SUNRISE. In addition, Oregon State University research vessels YAQUINA and CAYUSE will occupy hydrographic survey lines off Oregon out to about 200 miles offshore between June 19 and July 3, and will troll for albacore during daylight hours when in favorable water temperatures. Oregon State University also plans additional albacore oceanography cruises on R/V CAYUSE off Oregon as follows: July 27-August 2, August 7-12, August 25-September 1, and September 8-14. In addition, in similar fashion to last summer, OSU will coordinate a series of remote-sensing overflights by Coast Guard, Air Force, and NASA aircraft off Oregon and Washington. These flights will examine sea-surface temperature and water color patterns; information collected from the flights will be included in the daily messages and periodic bulletins. All fish reports from the scouting

vessels, negative as well as positive, will be incorporated into daily albacore advisory broadcasts over WWD and the Astoria Marine Operator. The JORDAN will also transmit her fishing reports to interested boats over the normal fishing boat frequencies. The call letters for JORDAN are WTDK.

The success of the cooperative albacore advisory program depends on the input of timely, first-hand information from fishermen at sea, as well as from dock operators and processors. It cannot be overstated how insufficient information restricts the quality and timeliness of the advisory materials. To provide a medium for communication of oceanographic and current fishing data, radio station WWD will operate as follows:

Frequencies:

Voice only	Telegraph only
4,415.8 kHz	4,262 kHz
8,805.6 kHz	8,698 kHz
12,403.5 kHz	12,871 kHz
16,533.5 kHz	17,105 kHz
22,079.5 kHz	22,419 kHz

Hours of operation: Unlimited as requested, normally 0400-0100 local time 7 days per week, including holidays.

Class of Traffic: As approved by radio station WWD. Inter-ship operation, other than for relay of traffic and scientific exchange of data, is not authorized.

Boat operators interested in participating to provide information services directly to WWD and BCF are requested to write for further details to:

Director
Bureau of Commercial Fisheries
Fishery-Oceanography Center
P.O. Box 271
La Jolla, California 92037

OSU Albacore Central may be contacted by writing:

Albacore Central
Department of Oceanography
Oregon State University
Corvallis, Oregon 97331

or by calling collect (503) 754-3354.

In addition to attempting to provide service of value to the fishing industry, there are also strong concurrent research programs which seek to learn more about the distribution, abundance and availability of albacore tuna in the northeast Pacific Ocean. Satisfactory measurement of the biological aspects of the albacore tuna population and the effects of varying economic conditions have lagged far behind progress in monitoring and understanding the environment. Little progress has been made on the estimation of year-class strength, apparent fish abundance, and fishing effort for albacore. Much of this information must come from you, the fishermen, by keeping logbook records. If any fisherman does not have a logbook and is willing to keep one, please contact OSU Albacore Central or California Department of Fish and Game, Terminal Island, California.

Good fishing! And please let us know if we can assist you in any other way.

R. Michael Laurs
Leader, Fishery-Oceanography Group
Fishery-Oceanography Center
Bureau of Commercial Fisheries

Daniel Panshin
Oceanographer, Sea Grant
Albacore Central
Oregon State University

ALBACORE SEASON—1970 OPERATIONS

A forecast of the outlook for the 1970 albacore season will be issued by the Bureau of Commercial Fisheries in early June. The forecast will include short-term projections of albacore distribution, oceanographic and atmospheric trends, and landings.

Radio Station WWD, licensed to the Bureau of Commercial Fisheries and located on the campus of the Scripps Institution of Oceanography, University of California at San Diego, will resume its broadcasts of albacore fishery information again this year. Double sideband voice broadcasts will be transmitted from WWD twice daily during weekdays only from June 17-October 31 on frequency 4415.8 kHz and 8805.6 kHz at 0600 PDT and 2045 PDT. Single sideband transmissions will be broadcast by WWD on 8805.6 and 12403.5 kHz. Broadcasts will include the latest albacore information obtained from research vessels, cooperating fishing vessels, unloading station operators, and will contain sea temperatures and other pertinent weather information believed useful to albacore fishermen.

In addition, at the end of each 15-day calendar period, the Fishery-Oceanography Center will encode and prepare for transmission (twice daily for two consecutive days the 15-day sea surface isotherm charts which are routinely mailed to about 900 readers. Map coordinates for the 15-day chart analysis ending on a given date covering the region east of 130° W. longitude and 30-50° N. latitude will be coded as part of the message.

Sample Broadcast

"Daily albacore fishery information, July 31, 1969.

Fishing information:

Strong winds in fishing district southwest 1960 fathom spot are believed to have hindered fishing there today. No fishing reports have been received from this area today. Few boats are riding the weather. Most are in port waiting for breaks in the weather.

Center of fishing off Oregon and Washington remains unchanged today in district 100-120 miles offshore Columbia River to Cape Shoalwater. One boat reported about 350 fish yesterday 90-100 miles off Cape Falcon and that some other boats had scores of 400-500 fish. Weather reported good.

Weather summary:

Large Stationary high pressure system continues to dominate weather northeastern Pacific Ocean with 1035 MB center located near 42° N., 148. W. Ridge extending from northeastern quadrant of high is building slowly over coast Washington-Oregon and northern California. Thermal trough over California interior receding southward resulting in northerly wind flow maximum offshore region from Cape Mendocino to south of Point Conception Thursday. Fairly stationary weak low pressure trough over northern Gulf of Alaska expected to remain fairly stationary through Friday. General surface pressure pattern over northeastern Pacific Ocean expected to remain fairly stationary through Friday with only regional north-south shifts in wind flow maximum off California Coast.

Conditions offshore outside 40 miles:

Oregon--Winds variable-light to moderate 8-14 knots with small seas Thursday. No change expected for Friday.

Northern California--Winds north-northwest 12-18 knots with slight to moderate seas Thursday. Little change expected for Friday.

Cape Mendocino to south of Point Conception--Strong northerly to northwesterly winds 18-30 knots with rough seas and heavy swell Thursday. Strong winds and rough seas expected to continue through Friday.

Outlook:

Expect 60-degree isotherm to build north to Destruction Island thence northwestward to 50 degrees north at 130 degrees west. Look for best fishing 50-150 miles offshore in region where depth of 60-degree isotherm is 80-100 feet. Central California offshore district should be good whenever winds and seas abate. Albacore should hold in 1960 fathom spot off Point Conception next 2 weeks as residual cold eddy persists downstream from intense upwelling zone.

Attention all boats:

Coast Guard San Francisco requests information on missing vessel COMPASS STAR-WY4440. Anyone knowing or in contact with COMPASS STARR should contact nearest Coast Guard facility.

Map coordinates of 15-day chart ending 31 July 1969 covering region east of 130° W. longitude and 25-50° N. latitude.

Message coded as follows:

First 3 numbers are latitude in degrees and tenths.
Last 4 numbers are longitude in degrees and tenths.

Message:

Position of 60 degree isotherm	Position of 64 degree isotherm
4861300	3681300
4841290	3501289
4641249	3401291
4561249	3331290
4491251	3301284
4371252	3131250
4201260	3041210
4151262	3051200
4031265	3061191
3921262	3151185
3741270	3251188
3681268	3331195
3491240	3401196
3491233	
3611222	

BCF F-O Center, La Jolla
(End of broadcast.)"

The above message, when decoded and plotted as in the example following this section, provides the fisherman at sea with a current analysis of the 60-64° F. temperature zone (from which more than two-thirds of the total Pacific coast albacore landings have been produced in recent years). In addition, a summary of the Fishery-Oceanography Center staff's best estimate of what is expected to happen in the succeeding 15-day period will be included as in the sample above.

To make the advisory broadcast fully effective, the Fishery-Oceanography Center requires timely information from all sources at sea and ashore. To provide a medium for communication of oceanographic and current fishing data, Radio Station WWD will operate on the following frequencies and scheduled times:

Voice only	Telegraph only
4,415.8 kHz	4,262 kHz
8,805.6 kHz	8,698 kHz
12,403.5 kHz	12,871 kHz
16,533.5 kHz	17,105 kHz
22,079.5 kHz	22,419 kHz

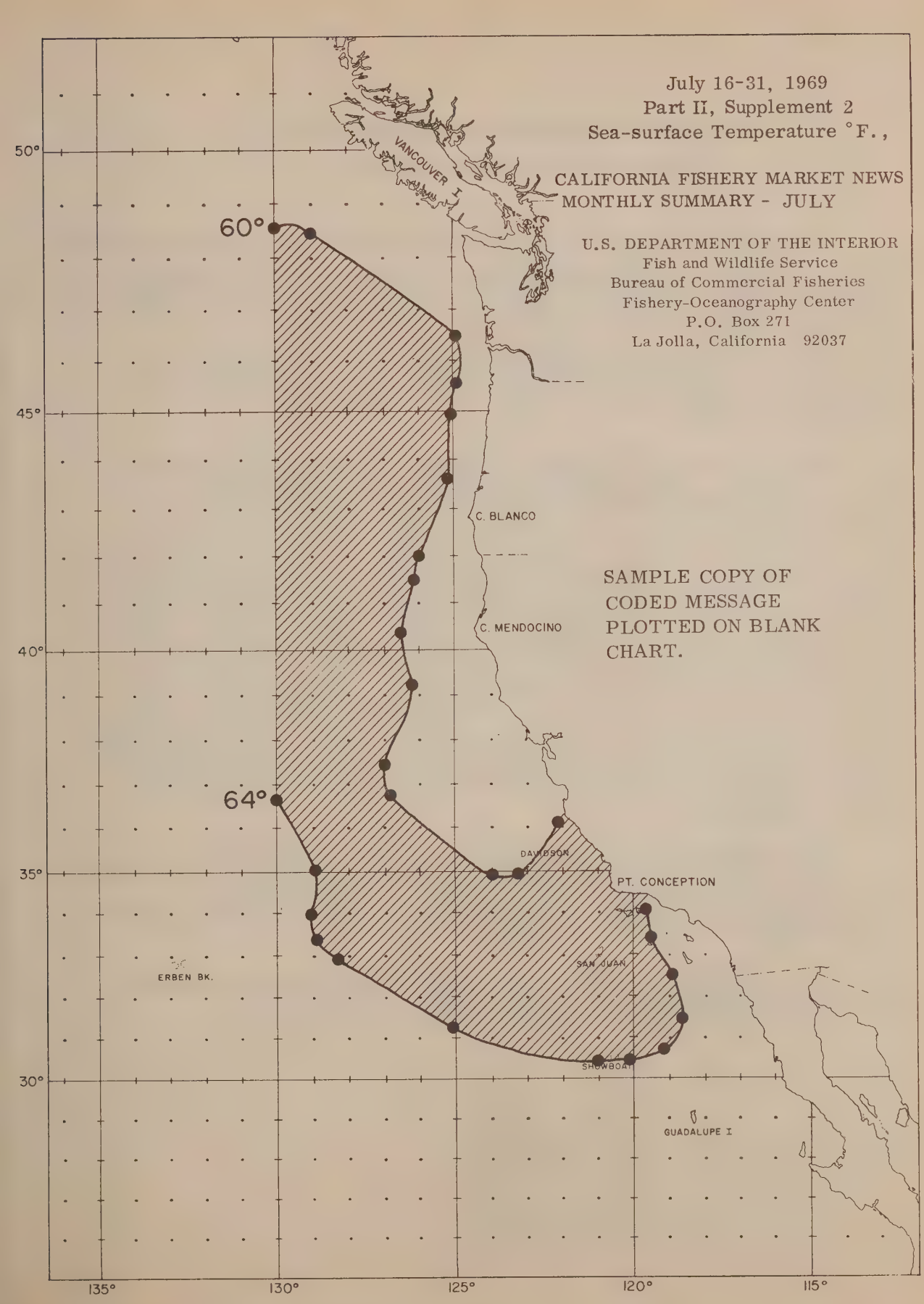
Hours of Operation: Unlimited as requested, normally 0400-0100 local time 7 days per week, including holidays.

Class of Traffic: As approved by Radio Station WWD. Inter-ship operation, other than for relay of traffic and scientific exchange of data, is not authorized.

Boat operators interested in participating to provide information services directly to WWD are requested to write for further details to:

Director
Bureau of Commercial Fisheries
Fishery-Oceanography Center
P. O. Box 271
La Jolla, California 90237

Staff, Fishery-Oceanography Program
May 6, 1970


July 16-31, 1969
Part II, Supplement 2
Sea-surface Temperature °F.,
CALIFORNIA FISHERY MARKET NEWS
MONTHLY SUMMARY - JULY
U.S. DEPARTMENT OF THE INTERIOR
Fish and Wildlife Service
Bureau of Commercial Fisheries
Fishery-Oceanography Center
P.O. Box 271
La Jolla, California 92037
SAMPLE COPY OF
CODED MESSAGE
PLOTTED ON BLANK
CHART.
VANCOUVER I.
60°
64°
C. BLANCO
C. MENDOCINO
DAVIDSON
PT. CONCEPTION
SAN JUAN
SHOWBOAT
ERBEN BK.
GUADALUPE I
50°
45°
40°
35°
30°
135°
130°
125°
120°
115°

NEW SEA SURFACE TEMPERATURE CHARTS FOR FASTERN TROPICAL PACIFIC

This issue of Fishing Information contains three new sea surface temperature charts for the eastern tropical Pacific which will routinely be published each month in Fishing Information. The charts constitute an initial effort toward extending the Bureau of Commercial Fisheries fishery advisory to the tuna fleet in the eastern tropical Pacific. The new charts show contours of the isotherms for the month of April 1970, the anomaly from April 1969, and the anomaly from the long-term averages (climatology) given in two atlases - Navy H.O. 225 and NAVOCEANO SP-123.

In the past, the average monthly temperature for each 1° square, where data were available, from the eastern tropical Pacific was presented in numerical form; the anomaly charts were also in numerical form for each 1° square. This method of presenting temperature information resulted in a field of numbers which was often difficult for the reader to interpret. Data collected during the EASTROPAC Expeditions resulted in a better understanding of the seasonal and spatial distribution of sea surface temperature in the eastern tropical Pacific and made it possible to develop contour analysis techniques for sea surface temperature in this region. The computer is used to plot the field of current temperature observations and a separate field of climatological data based on Navy H.O. 225 and NAVOCEANO SP-123 (from 20° N. to 20° S.). The plot of climatological data and the contours of isotherms are drawn by hand using both the current observations and climatological data. Contours based on current data are shown as solid lines and those based on climatological data, where current observations are sparse or lacking, are shown as dashed lines.

The yearly sea surface temperature anomaly chart is obtained by graphically subtracting the analysis for April 1969 from the analysis for April 1970. The long-term anomaly chart is obtained by graphically subtracting the analysis based on climatology from the April 1970 analysis.

Mr. Forrest Miller, on BCF contract with the Inter-American Tropical Tuna Commission, developed the analysis and prepared the charts.

SEA SURFACE TEMPERATURE CHARTS, EASTERN PACIFIC OCEAN
APRIL 1970

Acknowledgements

The following organizations and stations contributed data for the April 1970 charts:

U.S. Bureau of Commercial Fisheries Biological Laboratories La Jolla, California, Honolulu, Hawaii, and Seattle, Washington
U.S. Naval Weather Service, Fleet Numerical Weather Central, Monterey, California
Environmental Science Services Administration
U.S. Weather Bureau, San Diego, California
U.S. Coast and Geodetic Survey, Pacific Marine Center, Seattle, Washington
Global Marine Inc.; GLOMAR CHALLENGER
Hopkins Marine Station, Pacific Grove, California, J. P. Balesteri
Inter-American Tropical Tuna Commission, La Jolla, California
Inter-American Geodetic Survey by A. Chavez and L. Peren at Puerto Armuelles, Panama; D. Chavez at Talara, Peru; G. Castillo at San Juan, Peru
Kelco Company, San Diego, California
LMR Inc., San Diego, California
Matson Navigation Company, San Francisco; S. S. CALIFORNIAN
Pacific Missile Range, Range Operations Department, Geophysics Division Point Mugu, California
Pacific Oceanographic Group, Nanaimo, British Columbia, by H. J. Hollister from observations by G. C. Wilks at Langara Island Light; R. W. Pigott at Cape St. James Light; Lily Collins at Kains Island Lightstation; O. A. Edwards at Amphitrite Point Light
Scripps Institution of Oceanography, La Jolla, California, by Margaret Robinson
Scripps Institution Oceanography Research Vessels ALEXANDER AGASSIZ, THOMAS WASHINGTON, ELLEN B. SCRIPPS, OCONOSTOTA, FLIP, ALPHA HELIX
Fishing Vessel MARTINAC

Charts

Figure 1.--Mean sea surface temperature (°F) derived from approximately 8000 observations. Squares show temperatures at weather ship stations. Numerals on shore are temperatures at coastal and lightship stations.

Figure 2.--Deviation of sea surface temperatures (°F) from long term charts of H.O. 225. Hatched areas are colder in 1970.

Figure 3.--Deviation of sea surface temperatures (°F) from those of April 1969. Hatched areas are colder in 1970.

Figure 4.--Sea surface temperatures (°F) derived from approximately 2000 observations. Numerals on shore are temperatures at coastal stations.

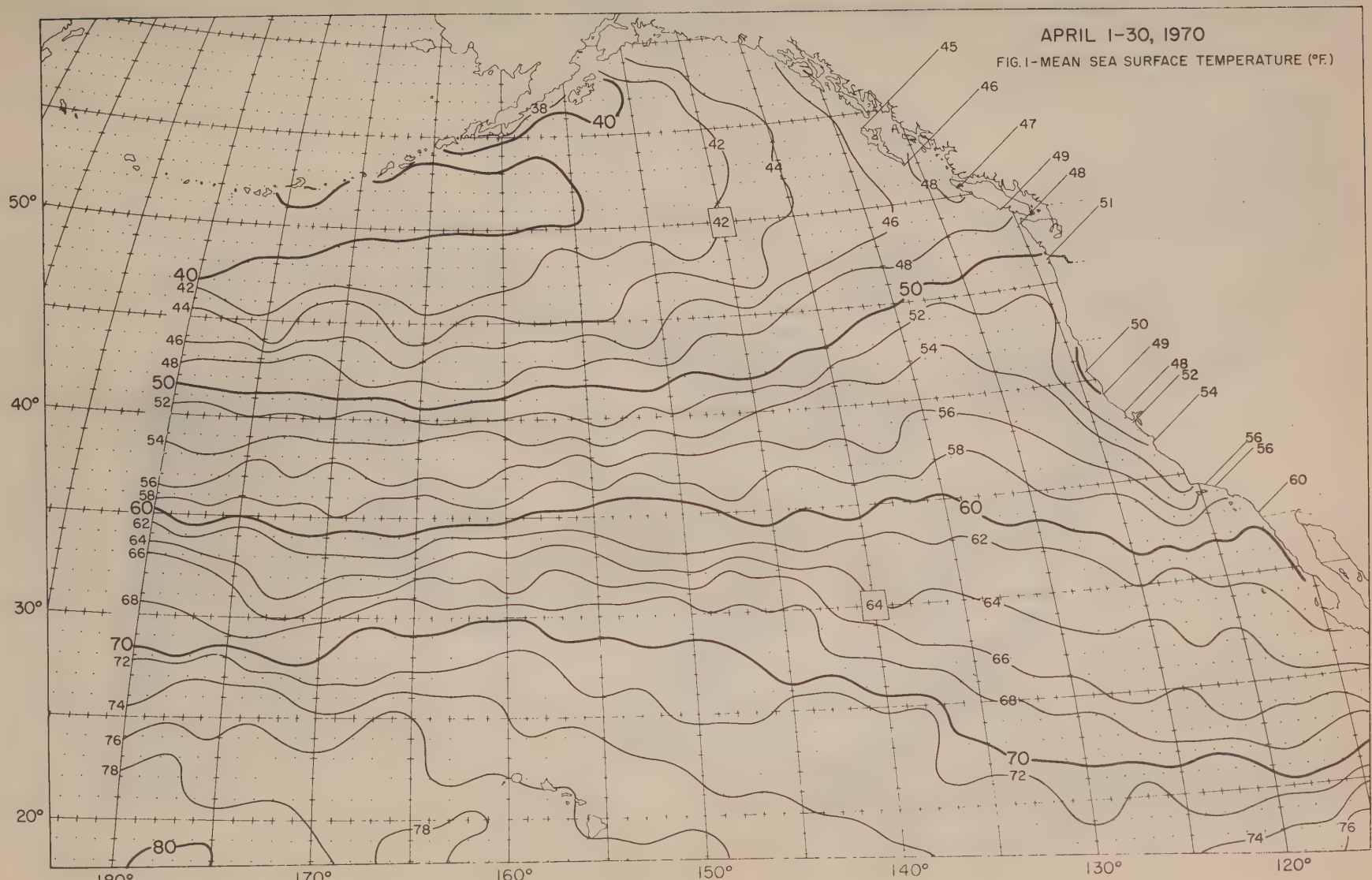
Figure 5.--Deviation of sea surface temperatures (°F) from long term charts of H.O. 225 and N.O.O. Sp-123. Shaded areas are colder in 1970.

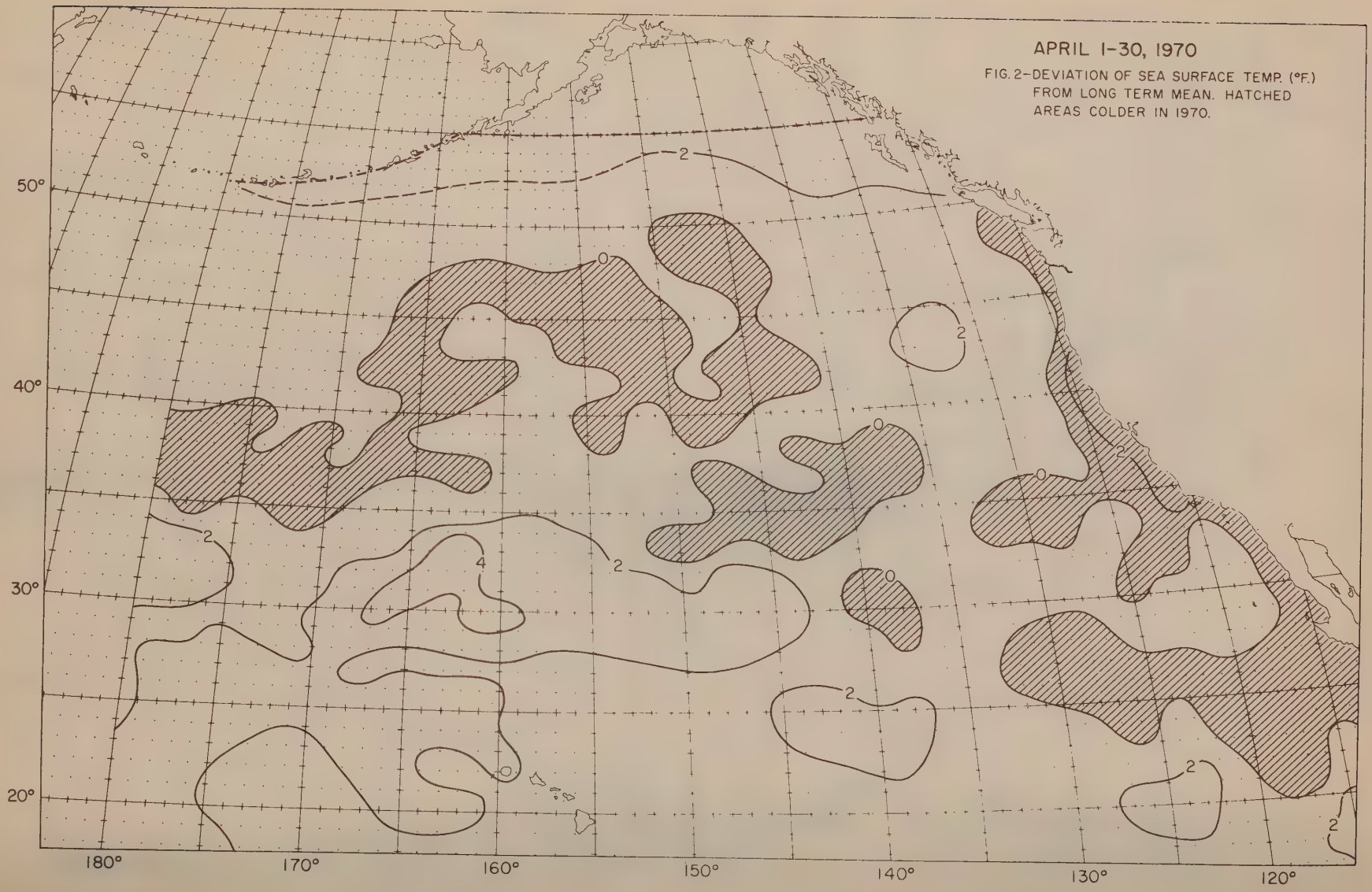
Figure 6.--Deviation of sea surface temperatures (°F) from those of April 1969. Shaded areas are colder in 1970.

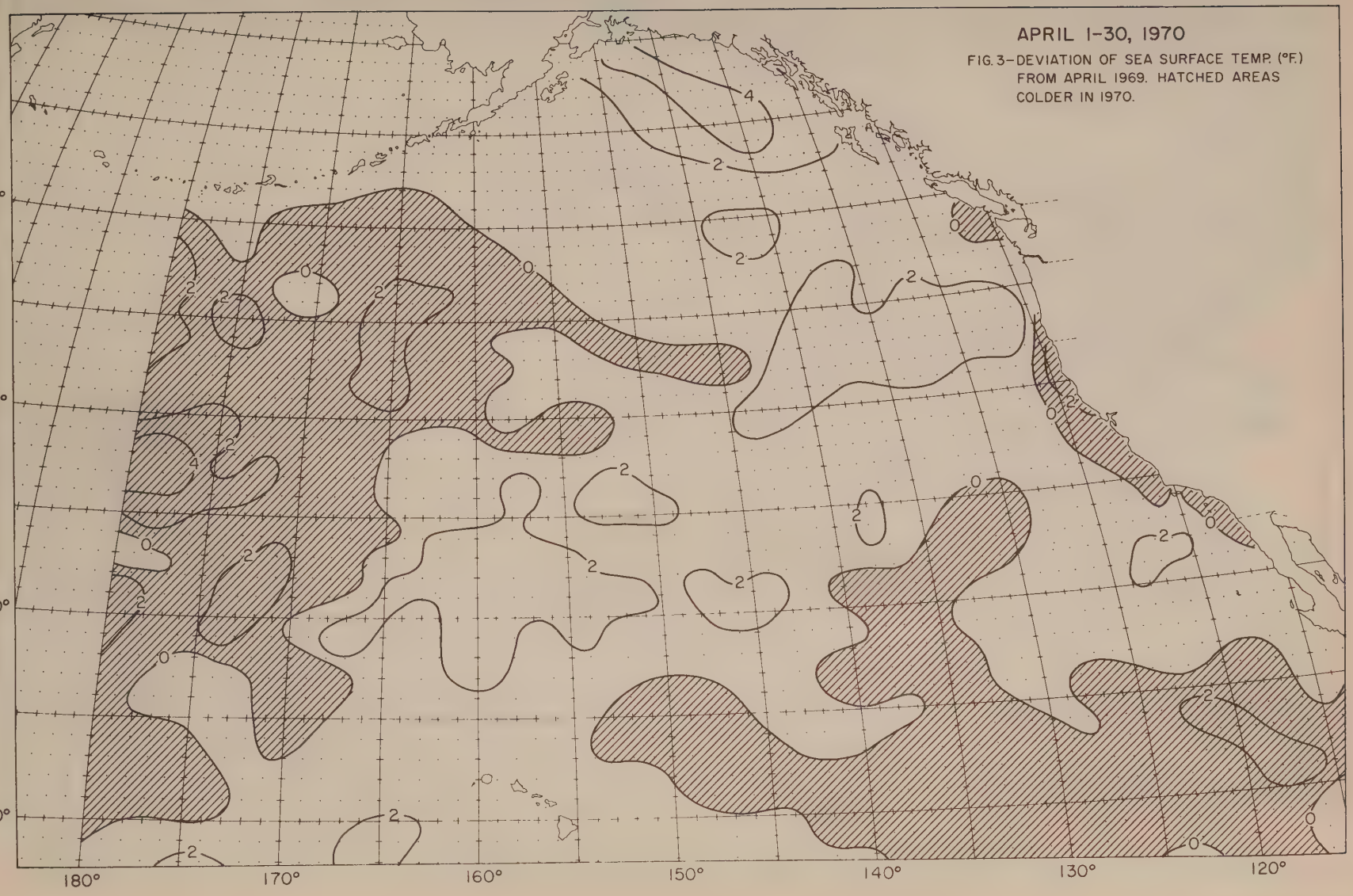
Figure 7.--10-year mean (1961-1970) observed sea level values of barometric pressure (millibars), resultant wind direction (degrees true), resultant wind speed (knots), and average wind speed (knots) regardless of direction.

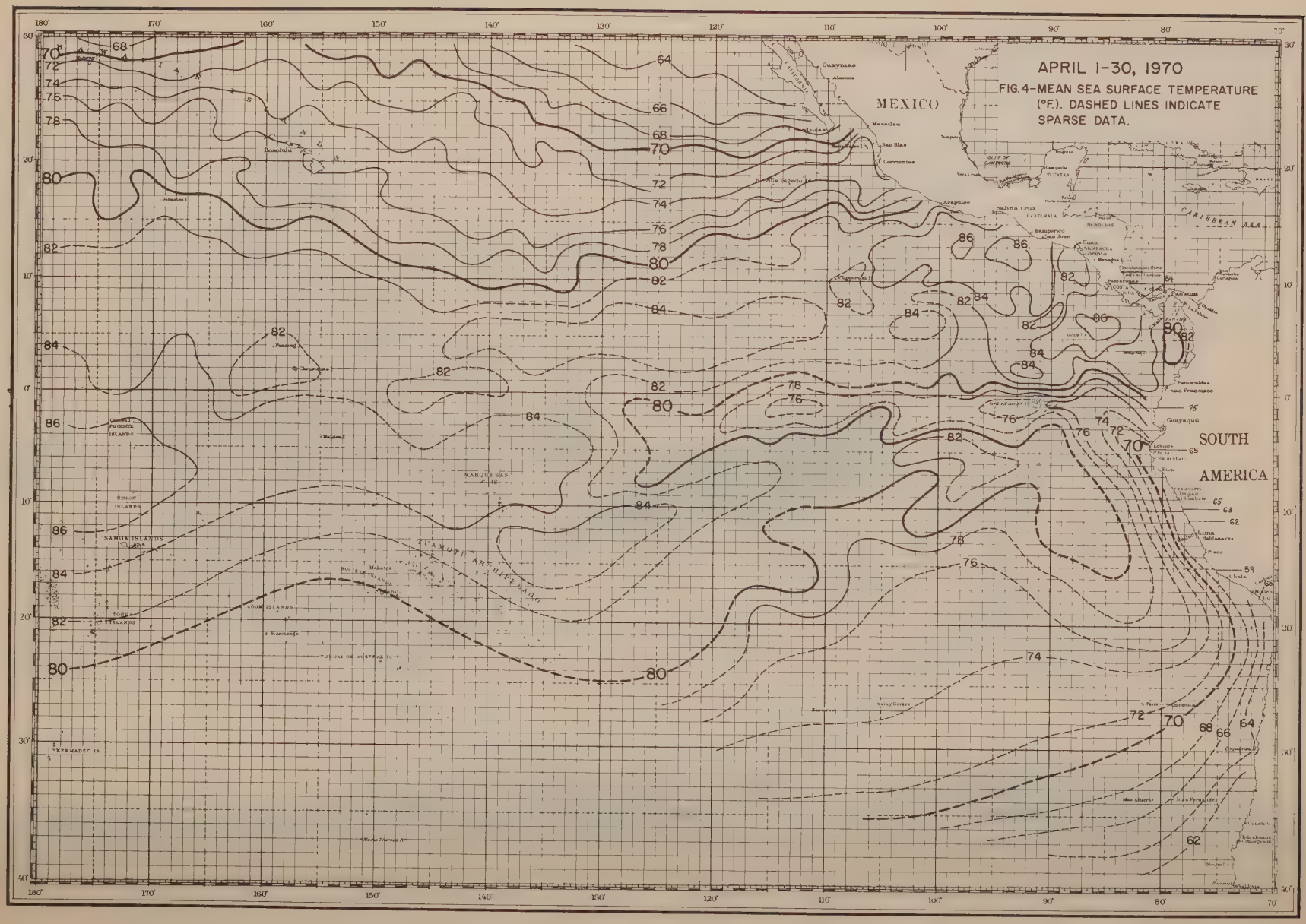
Figure 8.--Observed sea level values of barometric pressure (millibars), resultant wind direction (degrees true), resultant wind speed (knots), and average wind speed (knots) regardless of direction derived from approximately 5000 observations.

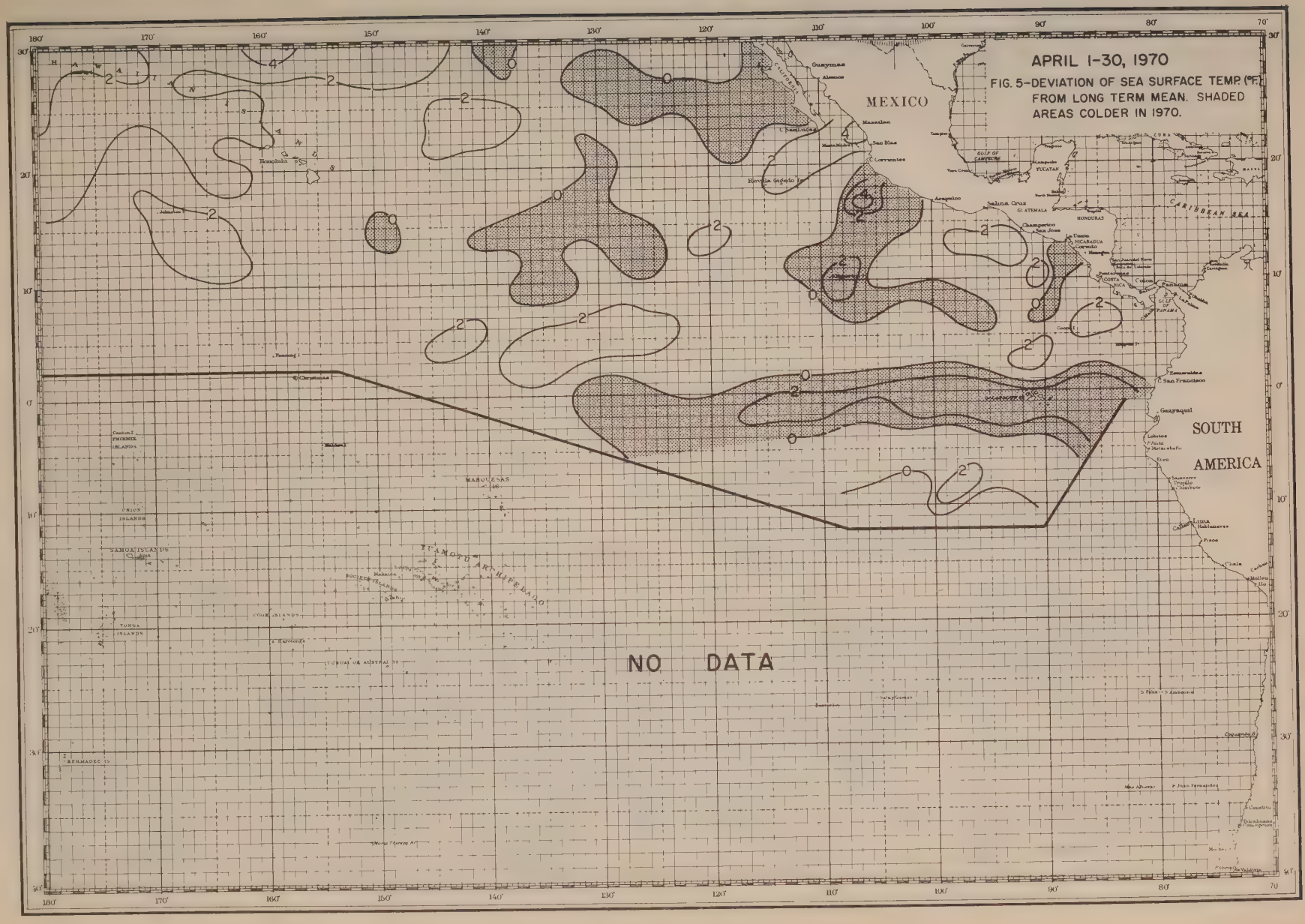
James A. Renner, Fishery Biologist
Kenneth S. Raymond, Scientific Illustrator
May 7, 1970

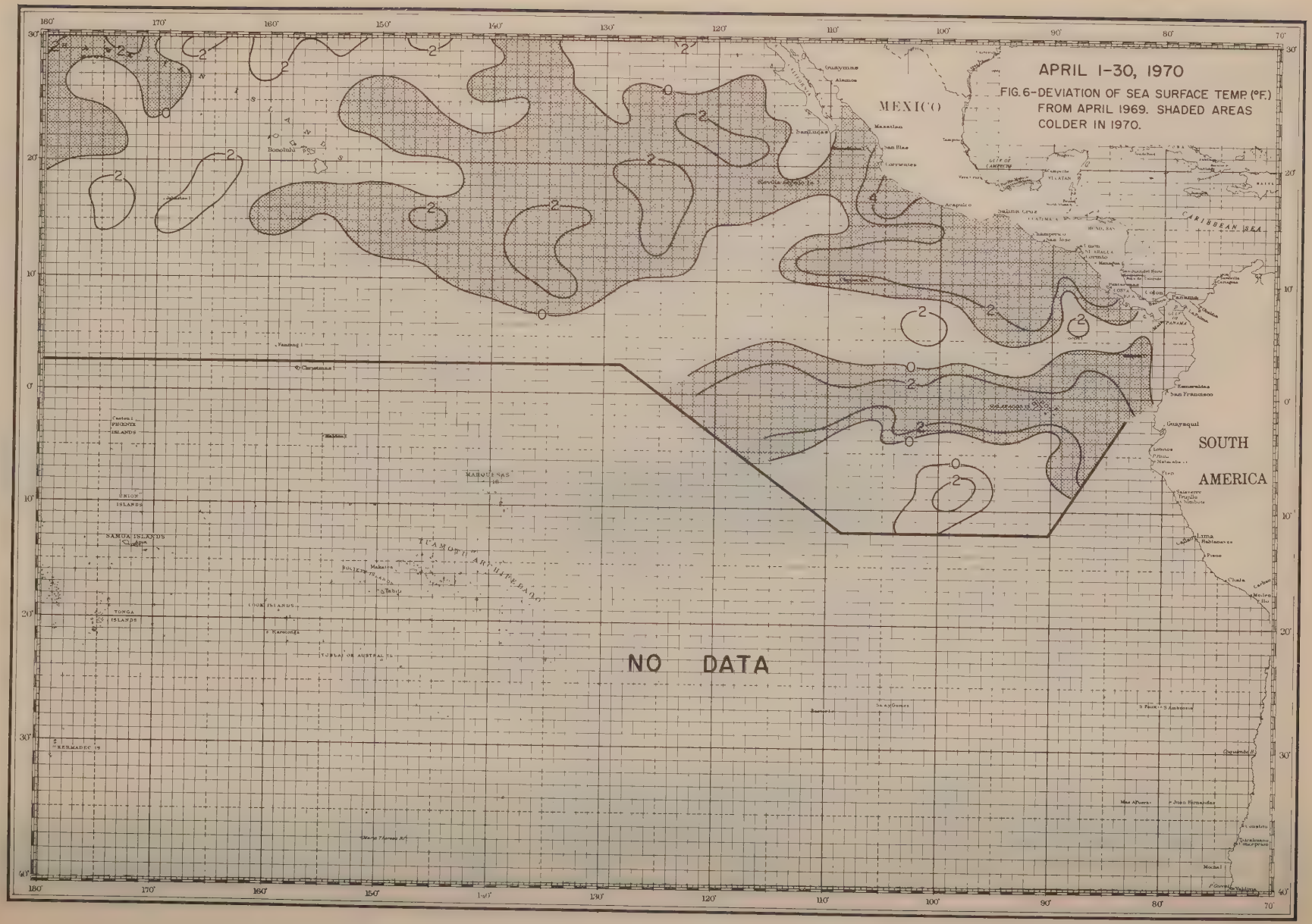

APRIL 1-30, 1970
FIG. 1 - MEAN SEA SURFACE TEMPERATURE (°F.)
50°
40°
30°
20°
180°
170°
160°
150°
140°
130°
120°

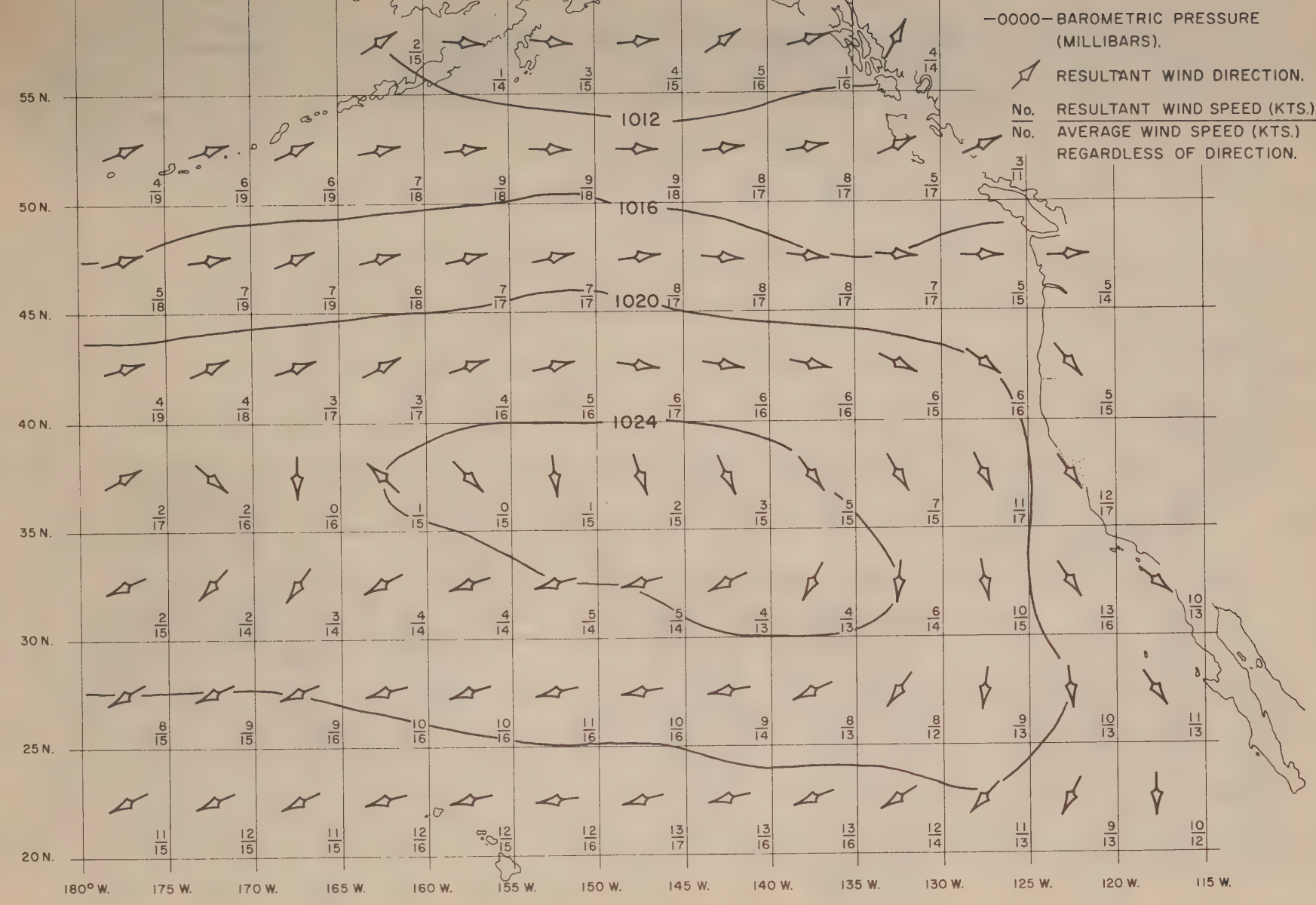

APRIL 1-30, 1970
FIG. 2-DEVIATION OF SEA SURFACE TEMP. (°F.) FROM LONG TERM MEAN. HATCHED AREAS COLDER IN 1970.
50°
40°
30°
20°
180°
170°
160°
150°
140°
130°
120°
2
0
2
0
2
0
4
2
0
2
2
2

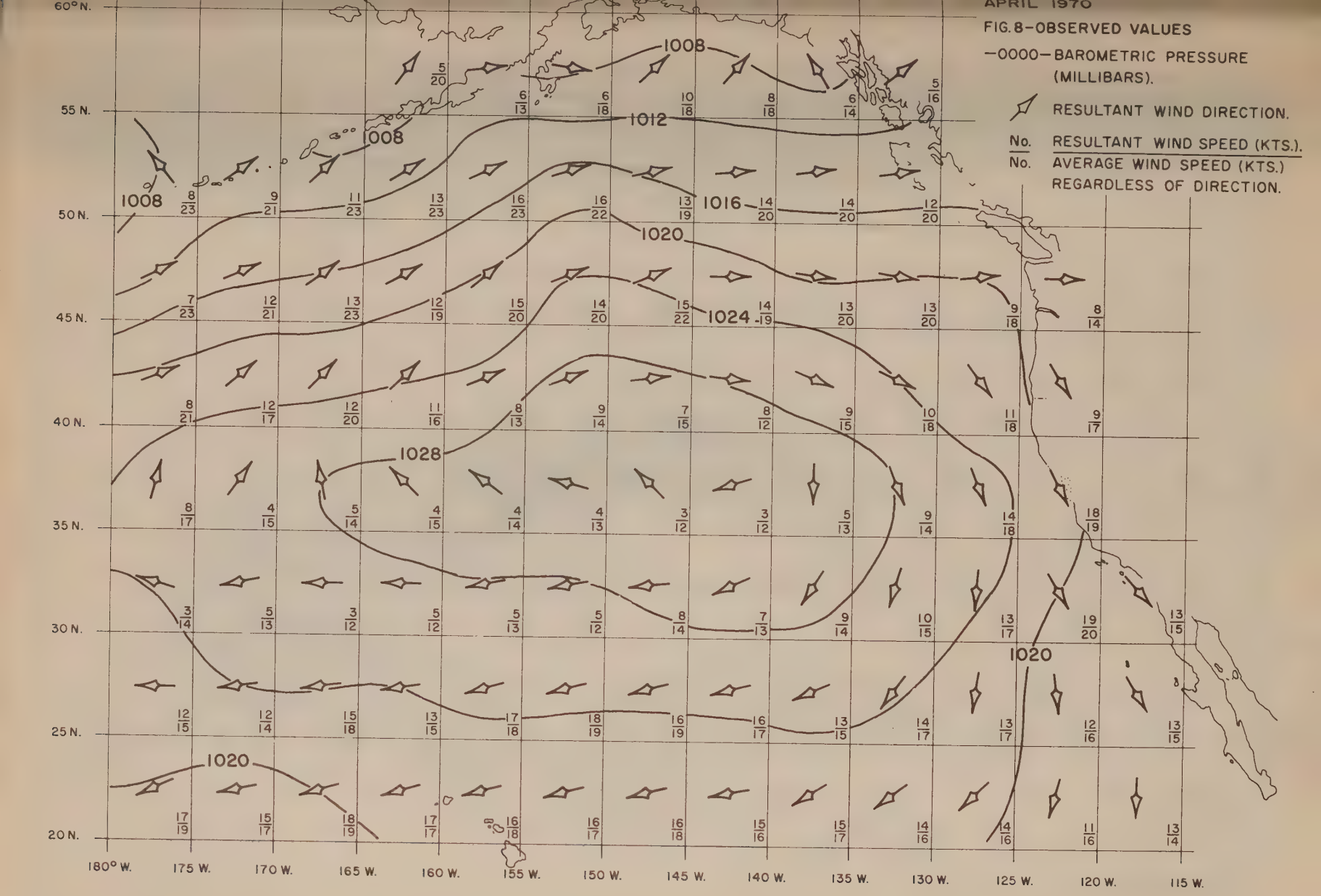

APRIL 1-30, 1970
FIG. 3-DEVIATION OF SEA SURFACE TEMP. (°F.) FROM APRIL 1969. HATCHED AREAS COLDER IN 1970.
50°
40°
30°
20°
180°
170°
160°
150°
140°
130°
120°

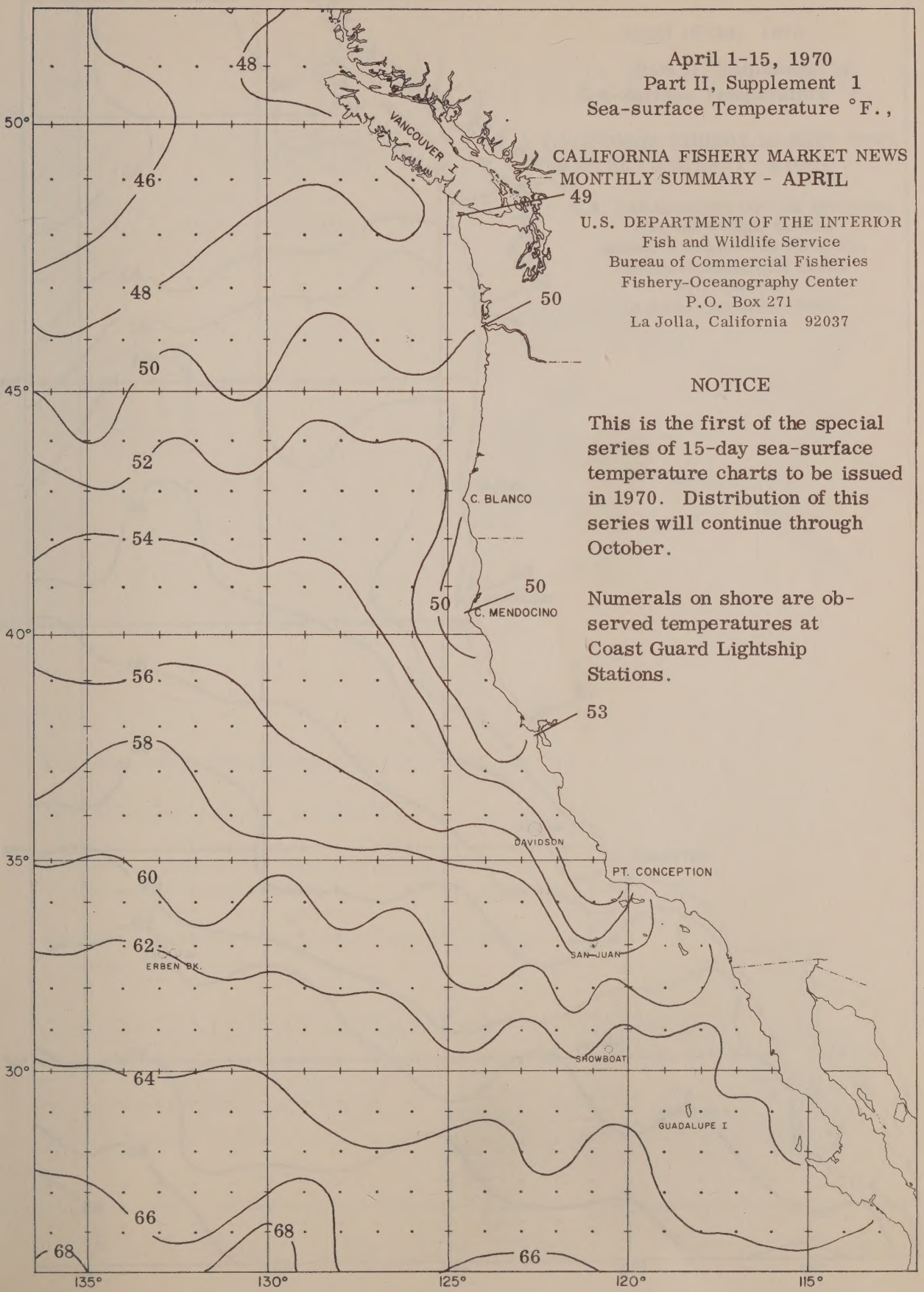

APRIL 1-30, 1970
FIG. 4-MEAN SEA SURFACE TEMPERATURE (°F.). DASHED LINES INDICATE SPARSE DATA.
MEXICO
SOUTH AMERICA
CARIBBEAN SEA
HAWAIIAN ISLANDS
Honolulu
Acapulco
Guayaquil
Lima
Valparaiso
Callao
Easter Island
Juan Fernandez
Galapagos Is.
MARQUESAS
SAMOA ISLANDS
TUAMOTU ARCHIPELAGO
TUBUAI OR AUSTRAL IS.
PHOENIX ISLANDS
UNION ISLANDS
TOKELAU ISLANDS
KERMADEC IS.
Pitcairn I.
Mas Afuera
Mas a Tierra


APRIL 1-30, 1970
FIG. 5-DEVIATION OF SEA SURFACE TEMP. (°F) FROM LONG TERM MEAN. SHADED AREAS COLDER IN 1970.
MEXICO
SOUTH AMERICA
CARIBBEAN SEA
NO DATA


APRIL 1-30, 1970
FIG. 6-DEVIATION OF SEA SURFACE TEMP. (°F.) FROM APRIL 1969. SHADED AREAS COLDER IN 1970.
NO DATA
MEXICO
SOUTH AMERICA
CARIBBEAN SEA
HONOLULU
CHRISTMAS
MARQUESAS
SAMOA ISLANDS
TONGA ISLANDS
COOK ISLANDS
TUAMOTU ARCHIPELAGO
TAHITI
KERMADEC IS.
GUAYAQUIL
LIMA
PANAMA
ACAPULCO
MAZATLAN
MANZANILLO
SAN BLAS
TORREMOLINOS
GUAYMAS
ALAMOS
SALINA CRUZ
CHAMPERICO
SAN JOSE
SAN FRANCISCO
PUNTA ARENAS
PUERTO MONTT
CHILOE
TALCAHUANO
VALPARAISO
COQUIMBO
ARICA
IQUIQUE
PISCO
CHALA
MOLLENDO
MATARANI
TALARA
PAITA
SALAVERRY
TRUJILLO
CHIMBOTE
PUNTA NEGRA
MANTA
ESMERALDAS
BUENAVENTURA
TUMACO
CALDERA
COQUIMBO
MEJILLONES
ANTOFAGASTA
TOCOPILLA
CHANARAL
PUERTO MONTT
CHILOE
TALCAHUANO
VALPARAISO
COQUIMBO
ARICA
IQUIQUE
PISCO
CHALA
MOLLENDO
MATARANI
TALARA
PAITA
SALAVERRY
TRUJILLO
CHIMBOTE
PUNTA NEGRA
MANTA
ESMERALDAS
BUENAVENTURA
TUMACO
CALDERA
COQUIMBO
MEJILLONES
ANTOFAGASTA
TOCOPILLA
CHANARAL


—0000— BAROMETRIC PRESSURE (MILLIBARS).
RESULTANT WIND DIRECTION.
No. RESULTANT WIND SPEED (KTS.).
No. AVERAGE WIND SPEED (KTS.) REGARDLESS OF DIRECTION.
1012
1016
1020
1024
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.


APRIL 1970
FIG. 8-OBSERVED VALUES
—0000— BAROMETRIC PRESSURE (MILLIBARS).
RESULTANT WIND DIRECTION.
No. RESULTANT WIND SPEED (KTS.).
No. AVERAGE WIND SPEED (KTS.) REGARDLESS OF DIRECTION.
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
1008
1012
1016
1020
1024
1028



April 1-15, 1970
Part II, Supplement 1
Sea-surface Temperature °F.,

CALIFORNIA FISHERY MARKET NEWS
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NOTICE

This is the first of the special series of 15-day sea-surface temperature charts to be issued in 1970. Distribution of this series will continue through October.

Numerals on shore are observed temperatures at Coast Guard Lightship Stations.

April 16-30, 1970

Part II, Supplement 2
Sea-surface Temperature °F.,

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